

REMARKS

By the present amendments, Applicants are canceling previously submitted claims 1-73 without prejudice or disclaimer, and are adding new claims 74-158 to the application. Of these newly added claims, claims 74, 79, 98-100, 101 and 132-134 are independent claims.

Claims 74 and 79 define a metal-polishing liquid or metal-polishing liquid material, comprising an ingredient group of various ingredients which include at least one of esters, ethers, polysaccharides, salts of amino acids, polycarboxylic acid, salts of polycarboxylic acids, vinyl polymers, sulfonic acids, sulfonates and amides. Claims 98-100 define a metal-polishing liquid material including various ingredients, claim 98 reciting that the ingredients include a solvent in which the solubility of the protective film-forming agent is at least 25 g/liter, claim 99 reciting that the ingredients include a good solvent for the protective film-forming agent, and claim 100 reciting that the ingredients include at least one of alcohols, ethers and ketones. Independent claim 101 recites a metal-polishing liquid material comprising various ingredients including a dissolution promoter for the protective film-forming agent, and wherein a polishing liquid is prepared by diluting the metal-polishing liquid material with at least 10-fold dilution factor of the metal-polishing liquid material. Claims 132-134 define a metal-polishing liquid including various ingredients, and with claim 132 reciting that the solubility of the protective film-forming agent of the liquid in a solvent of the liquid is at least 25 g/liter; claim 133 reciting that the liquid includes a good solvent for the protective film-forming agent; and claim 134 reciting that the liquid includes at least one of alcohols, ethers and ketones.

Of the remaining claims being newly added to the application, claims 82-89, 92, 93 and 143-148 define a method for producing a metal-polishing liquid as defined in respective parent claims, various of these metal-polishing-liquid-producing

claims including a diluting step (or mixing in a diluent); and various of the remaining claims (note, for example, claims 98, 91 and 149-151) define a polishing method.

The withdrawal of claims from consideration (under the heading "Election/Restrictions") as set forth on page 2 of the Office Action mailed January 12, 2005, is noted. Applicants respectfully protest this apparent election-of-species requirement, in that the Examiner has failed to indicate the separate species. In this regard, note that claims themselves do not constitute species, and without an indication by the Examiner as to the separate species Applicants are at a loss to make a determination and provide a listing of claims reading on the elected species.

In any event, noting the presently added claims, it is respectfully submitted that all of the newly added claims 74-158 read on the species originally presented for consideration and which has been treated on the merits in the above-identified application.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the reference applied by the Examiner in rejecting claims in the Office Action mailed January 12, 2005, that is, the teachings of U.S. Patent No. 5,954,997 to Kaufman, et al., under the provisions of 35 USC 102 and 35 USC 103.

It is respectfully submitted that this reference as applied by the Examiner would have neither taught nor would have suggested such a metal-polishing liquid (or liquid material), or such method of forming such liquid/material or of using such liquid/material, as in the present claims, including wherein the liquid/material has at least one of esters, ethers, polysaccharides, salts of amino acids, polycarboxylic acids, salts of polycarboxylic acids, vinyl polymers, sulfonic acids, sulfonates and amides. See claims 74 and 79; note also, for example, claim 111.

Furthermore, it is respectfully submitted that the applied reference would have neither taught nor would have suggested such liquid/material or such method of forming or using, as in the present claims, including wherein the liquid/material includes a solvent in which the solubility of the protective film-forming agent therein is at least 25 g/liter (note, e.g., claims 98 and 132, as well as claims 112-114); and/or wherein the liquid/material includes a good solvent for the protective film-forming agent (see, e.g., claims 99 and 133, as well as claims 115-117); and/or wherein the liquid/material includes at least one of alcohols, ethers and ketones (see, e.g., claims 100 and 134, as well as claims 118-120).

Moreover, it is respectfully submitted that the teachings of the applied reference would have neither disclosed nor would have suggested such liquid material, wherein a polishing liquid is prepared therefrom by diluting the liquid material with at least 10-fold dilution factor of the metal-polishing liquid material (see, e.g., claim 101).

Furthermore, it is respectfully submitted that the teachings of the applied reference would have neither disclosed nor would have suggested the other features of the present invention as in the dependent claims, including combination of the features discussed previously, and/or additional aspects including (but not limited to) wherein at least a part of the protective film-forming agent is solid having a mean particle size of at most 100 µm (note, e.g., claim 77); and/or wherein the liquid material further includes abrasive grains (note, e.g., claim 78); and/or various materials for the protective film-forming agent (note, for example, claims 96 and 97); and/or wherein the ingredients of the metal-polishing liquid material are divided into two constituent elements not mixed (note, for example, claims 106-109); and/or additional features of the method of producing the liquid including the dilution and/or use of a diluent (note, for example, claims 83-85).

Through use of the presently claimed method, liquid material and liquid, and further with the presently claimed polishing method, liquid material including components having a high concentration can easily be provided and transported; and a metal-polishing liquid according to the present invention can be readily prepared, at any of various locations, by adding, e.g., at least one diluent, and also by mixing the various components. The liquid material, having a high concentration, has advantages in that costs for producing the liquid can be reduced, and capacity of the tanks for storing, transporting and using the liquid in polishing plants can be reduced.

It must be emphasized that, different from convention polishing agents, a metal-polishing liquid material having a protective film-forming agent, with a high concentration, can be easily and effectively formed; and the metal-polishing liquid of the present invention is readily prepared from the metal-polishing liquid material having a high concentration by diluting the material. The present invention has advantages in that costs for producing the metal-polishing liquid can be reduced, and the capacity of the tanks for storing, transporting and using the liquid and the liquid material in polishing plants can be reduced. According to the present invention, material for the metal-polishing liquid may have a higher concentration, in accordance with polishing capabilities of the liquid. Note, for example, page 9, lines 12-23 of Applicants' specification.

Kaufman, et al. discloses a chemical mechanical polishing slurry especially useful for polishing copper and copper alloy-containing metal layers associated with a substrate selected from the group including integrated circuits, thin films, multiple level semiconductors and wafers. The slurry includes a complexing agent, at least one oxidizer, at least one abrasive and a film forming agent. See column 1, lines 7-16; and column 4, lines 9-22 and 58-65. The oxidizer used in the slurry is described,

for example, at column 5, lines 28-37; and the film forming agent of the slurry is described in this patent at, for example, column 5, lines 44-56. This patent further discloses that the complexing agents of the slurry are used in order to disturb the passivation layer formed on the substrate layer. Note the paragraph bridging columns 5 and 6 of this patent. This patent discloses that other well known polishing slurry additives may be incorporated, one class of optional additives being inorganic acids and/or salts thereof. See column 6, lines 22-31. This patent goes on to describe that in order to promote stabilization of a slurry against settling, flocculation and decomposition, a variety of optional slurry additives, such as surfactants, stabilizers or dispersing agents, can be used. See column 6, lines 34-45. This patent discloses that preferred surfactants include dodecyl sulfate sodium salt, sodium lauryl sulfate, dodecyl sulfate ammonium salt and mixtures thereof. See column 6, lines 62-67. Note also column 7, lines 1-5, describing that the slurry includes an abrasive. See also column 8, lines 35-41. This patent further discloses that, typically, the oxidizing agent and other non-abrasive components are mixed into an aqueous medium, such as deionized or distilled water, at predetermined concentrations under low shear conditions; and that a concentrated dispersion of the metal oxide abrasive, such as fumed alumina, is added to the medium and diluted to the desired loading level of abrasive. This patent goes on to describe that it is preferred that at least a 2-package system is used, where the first package includes the film-forming agent and any optional additives, and the second package includes the aqueous abrasive dispersion and an oxidizer. See column 8, lines 53-65.

It is respectfully submitted that this reference does not disclose, nor would have suggested, the features of the present invention as discussed previously, including wherein the liquid/material includes at least one of esters, ethers, polysaccharides, salts of amino acids, polycarboxylic acids, salts of polycarboxylic

acids, vinyl polymers, sulfonic acids, sulfonates and amides; and/or solubility of the protective film-forming agent; and/or degree of dilution (e.g., at least ten-fold dilution), and/or wherein the composition includes at least one of alcohols, ethers, and ketones, and advantages thereof as discussed in Applicants' disclosure.

The contention by the Examiner in the last paragraph on page 3 of the Office Action mailed January 12, 2005, that Kaufman, et al. discloses surfactants including at least one of the materials as in claims 74 and 79 of the present claims, the Examiner referring to column 6, lines 30-45 and 60-69 of Kaufman, et al., is respectfully traversed. It is respectfully submitted that the specific surfactants described in Kaufman, et al. include sodium and ammonium salts, and a sulfate, and it is respectfully submitted that the disclosure of surfactants as in Kaufman, et al. would have neither taught nor would have suggested inclusion of at least one of the specified materials in various of the present claims.

The contention by the Examiner in the first paragraph on page 4 of the Office Action mailed January 12, 2005, that Kaufman, et al. teaches a dissolution promoter in which the solubility of the protective film-forming agent is at least 25 g/liter, is respectfully traversed. Apparently, the Examiner is contending that this value is "inherent" in Kaufman, et al. Applicants respectfully challenge this conclusion of inherency by the Examiner, respectfully submit that there is no basis for this conclusion of inherency, and respectfully submit that Kaufman, et al. would have neither taught nor would have suggested such solubility, much less advantages thereof as discussed in Applicants' disclosure.

Similarly, it is respectfully submitted that Kaufman, et al. would have neither taught nor would have suggested including a good solvent for the protective film-forming agent in the liquid/material, and advantages thereof as in the present invention. Note that column 6, lines 30-45 of Kaufman, et al. refer to the film-

forming agents as destabilizing the uniform dispersion of abrasive in the slurry, with the surfactant, stabilizer or dispersing agent being used to avoid settling, flocculation and decomposition, e.g., of the abrasive. Such disclosure would have neither taught nor would have suggested the good solvent for the protective film-forming agent, as included in the liquid/material of the present invention, and advantages thereof.

Furthermore, it is emphasized that Kaufman, et al. discloses a two-package system and describes that a concentrated dispersion of the metal oxide abrasive is added to the medium and diluted to the desired loading level of abrasive in the final slurry. It is respectfully submitted that such disclosure would have neither taught nor would have suggested the at least a ten-fold dilution factor as in various of the present claims, and advantages thereof.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently in the application are respectfully requested.

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Respectfully submitted,

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